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Supplement I from Aureli et al., "Fission-Fusion Dynamics"
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What Does the Archeological Evidence Tell Us?

Because the major increase in brain size does not take place until relatively late in hominid evolution (the appearance of *Homo heidelbergensis*, ca. 0.5 million years ago; Aiello and Dunbar 1993), many of the steps outlined could not have taken place until quite late in human evolution. This conclusion is supported by the fact that a modern human life-history pattern (e.g., a greatly extended childhood) did not appear until very late in the sequence (probably not earlier than *H. heidelbergensis*; Thompson, Krovitz, and Nelson 2003) and that the shift from scavenging to large-scale hunting also did not occur much before the appearance of *H. heidelbergensis* (Klein 1999). The contribution of game to hunter-gatherer diets ranges from 25% to 100% (Marlowe 2001); among the Hadza, for example, meat provides 50% of calories consumed by active foragers (O'Connell et al. 2002). High meat intake is associated with a division of labor in which men specialize in hunting and women in gathering, greatly increasing the interdependence of the sexes (Kaplan et al. 2000). Modern humans bring meat back to camp and distribute it among family units. The earliest evidence for a base camp and for hunting technology are possible huts from the late *Homo erectus* site of Bilzingsleben (Mania, Toepfer, and Vlcek 1980) and definite hunting spears dating from ca. 400,000 years ago from Schoeningen (Thieme 1997), both in Germany.

In this scenario, the function of fission and fusion may have shifted from allowing individually foraging group members to reduce resource competition by distributing themselves over the area according to food distribution to optimizing the use of resources in the area by central-place foraging with information exchange. This latter system allows the community as a whole to benefit from the knowledge of individuals about temporally variable resources (e.g., fruiting trees or fresh kills) and their depletion rates. In a more complex society, assuming that food is shared at the central place, individuals can further enhance survival chances by spreading out according to the distribution of food in the area to increase the community's food supply (Layton 2005; Smith 1991).

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